

Appl. No. 10/782,545
Amdt. Dated July 26, 2005

Attorney Docket No.: NSL-025
Reply to Office Action of May 25, 2005

REMARKS:**AMENDMENTS TO THE SPECIFICATION**

The specification has been amended to recite the serial numbers of the cross-referenced applications, as requested by the Examiner. The amendments on page 3 correct minor typographical and grammatical errors. As such, no new matter has been added with these amendments.

AMENDMENTS TO THE CLAIMS

To expedite prosecution, the Applicants have canceled claim 1 and rewritten claims 2 and 22 in independent form. The Applicants reserve the right to pursue the subject matter of claim 1 in a later-filed continuation or divisional application. Claims 14 and 17-21 have been amended to depend from claim 2. Claims 25-33 have been amended to correct informalities in the claim dependencies. The Applicants submit that no new matter has been entered with these amendments.

RESTRICTION REQUIREMENT

15 The Examiner argues that the application contains claims directed to three patentably distinct inventions respectively identified as follows:

- I. Claims 1-23 drawn to a method for treating a substrate surface.
- II. Claims 24-33 drawn to a substrate surface treatment system.

20 The Examiner has required election of one of the following species of the invention: ALD anodization, drying, annealing, exposure to reactive gas or vapor, electrodeposition, electropolishing.

In response, the Applicant hereby affirms the election, made in the telephone conversation of 5/13/2005, of Group I, claims 1 and 14-23 and species claims 2-5 readable on the species ALD. The Applicants also hereby elect newly added claim 34, which reads on the ALD species and is a linking claim linking groups I and II. The election is made with traverse based on non-allowance of linking claim 34. According to MPEP § 806.05(e):

If the apparatus claims include a claim to "means" for practicing the process, the claim is a linking claim and must be examined with the elected invention. If it is ultimately allowed, rejoinder is required. See MPEP § 809.04.

30 According to MPEP § 809.04:

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If a linking claim is allowed, the examiner must thereafter examine species if the linking claim is generic thereto, or he or she must examine the claims to the nonelected inventions that are linked to the elected invention by such allowed linking claim.

The Applicant submits that claim 34 is drawn to means for practicing the process of claim 1.

5 Therefore, according to MPEP 806.05(e), claim 34 must be examined along with the elected claims. Further, according to MPEP § 809.04, should claim 34 be allowed, the Examiner must rejoin and examine claims 24-33.

CLAIM REJECTIONS - 35 USC 102

Iszczukiewicz

10 Claims 1 and 19-21 were rejected under 35 USC 102(b) as being anticipated by US Patent 3,923,556 to Iszczukiewicz. In rejecting the claims, the Examiner argues that Iszczukiewicz discloses a method of treating a substrate surface comprising coiling a substrate into one or more coils in such a way that adjacent turns of the coil do not touch one another.

The Applicants respectfully traverse the rejections. The rejection of claim 1 is moot by virtue of its cancellation. Claim 19 has been amended to depend from claim 2, which recites that "the surface treatment process includes one or more atomic layer deposition (ALD) reactions." The Applicants submit that Iszczukiewicz is devoid of any teaching or suggestion of performing ALD reactions on a coiled substrate. As such, Iszczukiewicz does not anticipate claim 19. In addition, claims 20-21 are believed to be novel by virtue of their dependence from claim 19 as amended.

20 Chan

Claims 1 and 2 were rejected under 35 USC 102(e) as being as being anticipated by US Patent 6,716,693 to Chan et al. (hereinafter Chan). In rejecting the claims, the Examiner states that Chan discloses a method of treating a substrate surface comprising coiling a substrate into one or more coils in such a way that adjacent turns of the coil do not touch one another. The Examiner further states that the term coiling is taken in its broadest reasonable interpretation, which is, to form coils. The Examiner argues that Chan forms coils by etching away a sacrificial silicon nitride layer. The Examiner concludes that Chan places the substrate in an atomic layer deposition chamber and apply a bottom copper barrier layer by an ALD reaction.

The Applicant respectfully traverses the rejections. The rejection of claim 1 is moot by virtue of its cancellation. The Applicant respectfully submits that the Examiner's broad interpretation of the term "coiling" is improper. It is the official policy of the Office that during prosecution of a

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patent application, "the words of a claim must be given their "plain meaning" unless they are defined in the specification." See MPEP 2111.01, which states, inter alia, that "[d]uring examination, the claims must be interpreted as broadly as their terms reasonably allow." MPEP 2111.01 further states that "plain meaning" refers to the meaning given to the term by those of ordinary skill in the art.

The Examiner has apparently interpreted the term "coiling" to include the formation of a coiled trench in a surface of a substrate as taught by Chan et al. Given the above rules for interpreting claim language, the Applicants submit that the breadth of the term "coiling" as used in the present cannot go beyond the plain meaning of that term which would be reasonable to one of skill in the art. The Applicants submit that the Examiner's interpretation of the term "coiling" is unreasonable and inconsistent with the plain meaning of that term. The Merriam-Webster Online Dictionary (<http://www.m-w.com/cgi-bin/dictionary?book=Dictionary&va=coiling>) defines the verb "coil" to mean "to wind into rings or spirals," or "to roll or twist into a shape resembling a coil" or "to move in a circular or spiral course" or "to form or lie in a coil."

The Applicants respectfully submit that in claim 2 as amended the object of the verb "coiling" is "substrates". Furthermore, claim 2 recites "coiling one or more substrates into one or more coils" [emphasis added]. Given the above definitions of the verb "coil" and the teachings of the specification, e.g., as set forth in FIGs. 2A-2H, the Applicants submit that those of skill in the art would interpret "coiling the one or more substrates" to mean winding, rolling, twisting or otherwise forming the substrates into coiled or spiral shapes.

It is also worthy of note that Chan et al. do not use the word "coil" to describe the structure cited by the Examiner. Instead, in describing FIG. 5A, Chan et al. refer to "a planar spiral structure, consisting of a long micro-channel 52 in an insulating layer 50." See col. 7, lines, 44-48 and FIG. 5A of Chan. Thus, Chan does not teach "coiling one or more substrates into one or more coils" as set forth in claim 2. As such, Chan does not anticipate claim 2.

Meyer

Claims 1, and 14-16 were rejected as being anticipated by US patent Application Publication 2004/001922 to Meyer (hereinafter Meyer). In rejecting the claims it is argued that Meyer discloses a method for treating a substrate comprising coiling a substrate into one or more coils in such a way that adjacent turns of the coils do not touch, placing the coils in the treatment

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chamber and treating the coiled substrates by electrodeposition. The Applicant respectfully traverses the rejections.

The rejection of claim 1 is moot by virtue of its cancellation. Claim 14 has been amended to depend from claim 2, which recites that the surface treatment process includes one or more atomic layer deposition (ALD) reactions." The Applicants submit that Meyer is devoid of any teaching or suggestion of performing ALD reactions on a coiled substrate. As such, Meyer does not anticipate claim 14. In addition, claims 15-16 are believed to be novel by virtue of their dependence from claim 14 as amended.

CLAIM REJECTIONS - 35 USC 103

10 Chan in view of Marsh

Claims 3 and 5 were rejected under 35 USC 103(a) as being obvious over Chan as applied to claims 1 and 2 above in further view of US Patent 6, 380,983 to Marsh (hereinafter Marsh). In rejecting the claims it is stated that Chan discloses forming a TiN layer using an ALD surface reaction and that Marsh teaches that when forming TiN thin films, TiCl₄ is used as a starting material that will yield TiN in combination with NH₃ in an ALD process. It is concluded that it would have been obvious to use TiCl₄ when forming a TiN film as suggested by Marsh.

The Applicants respectfully traverse the rejection. As set forth above, the Applicants submit that, for the reasons discussed above, Chan is devoid of any teaching or suggestion of coiling one or more substrates as set forth in claim 2. Claims 3 and 5 depend, either directly or indirectly from claim 2 and recite additional features therefor. The Examiner has pointed to no teaching or suggestion within Marsh of coiling one or more substrates. As such, neither Chan, nor Marsh, nor any combination of Chan and Marsh teaches or suggests all the features of claims 3 and 5 and a prima facie case of obviousness is not present.

Chan in view of Norman

25 Claim 4 was rejected under 35 USC 103(a) as being obvious over Chan as applied to claims 1 and 2 above in further view of US Patent Application Publication 2002/0013487 to Norman et al. (hereinafter Norman). In making the rejection it is stated that Chan discloses all the features of claim 4 except for exposing the substrate to water vapor during the ALD reaction. It is argued that Norman teaches that when forming copper interconnects it is desirable to use water as an oxidizer in an ALD reaction to bond copper to the surface before reducing the copper oxide to

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pure copper. It is concluded that it would have been obvious to one of skill in the art to Modify Chan to use water as an oxidizing agent as taught by Norman with the expectation of successfully forming copper interconnects bonded to the substrate.

The Applicants respectfully traverse the rejection. As set forth above, the Applicants submit that Chan is devoid of any teaching or suggestion of coiling one or more substrates as set forth in claim 2. Claim 4 depends, indirectly from claim 2 and recites additional features therefor. The Examiner has pointed to no teaching or suggestion within Norman of coiling one or more substrates. As such, neither Chan, nor Norman, nor any combination of Chan and Marsh teaches or suggests all the features of claims 4 and a prima facie case of obviousness is not present.

10 Meyer

Claims 17 and 18 were rejected under 35 USC 103(a) as being obvious over Meyer. In rejecting claim 17 it is stated that Meyer does not expressly teach moving the roll of substrate material around the carousel as a method of forming the coiled substrate. It is argued, however, that doing so is one of only three possible ways if coiling the substrate. In rejecting claim 18 it is argued that although Meyer does not expressly teach placing two or more coiled substrates side by side, it would have been obvious to do so with an expectation that a greater amount of treated substrate could be made in the same amount of time.

The Applicants respectfully traverse the rejections. The Applicants do not accept the assertion that there are only three different ways of coiling the substrate from a roll around a carousel.

20 However, even if, arguendo, this assertion is correct, the Applicants submit that Claims 17 and 18 have been amended to depend from claim 2, which recites that the surface treatment process includes one or more atomic layer deposition (ALD) reactions." The Applicants submit that Meyer is devoid of any teaching or suggestion of performing ALD reactions on a coiled substrate. As such, Meyer does teach or suggest all the features of claims 17 and 18 and a prima facie case of obviousness is not present.

In addition, the Applicants submit that the Examiner's rationale in both rejections is that it would have been "obvious to try" the claimed features that are missing from the Meyer. The MPEP clearly identifies such reasoning as an improper rational for combining references. Specifically MPEP 2145(X)(B) sets forth an example of the improper "obvious to try" rational involving 30 "explor[ing] a new technology or general approach that seemed to be a promising field of experimentation, where the prior art gave only general guidance." With respect to claim 17, the

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Examiner states that "there would appear to be no advantage of performing any of these methods over the others." Similarly, with respect to claim 18 the Examiner cites the "expectation" that a greater amount of treated substrate could be made in the same amount of time. Thus, in both cases the Examiner suggests trying a new general approach where Meyer provides only general guidance. Therefore, for at least this additional reason, a prima facie case of obviousness is not present with respect to claims 17 and 18.

The Examiner has cited no particular teaching within Meyer or anywhere else tending to support his assertions that there are only three possible ways of coiling the substrate and that placing two or more coiled substrates would lead to an expectation that a greater amount of treated substrate could be made in the same amount of time. If these assertions are based on references known to the Examiner, the Applicants respectfully request that the Examiner provide these references as required by 37 CFR 1.104(d)(1). If these assertions are based on personal knowledge of the Examiner, the Applicants respectfully request, under the provisions of 37 CFR 1.104(d)(2) that the Examiner support these facts by an affidavit. The Applicant submits that if the Examiner assertions are based on information gleaned from the Applicants disclosure, the Examiner's rational is an improper use of hindsight (see MPEP 2145(X)(A)).

ALLOWABLE SUBJECT MATTER

The Applicant appreciates the Examiner's indication of allowable subject matter in claims 22 and 23. These claims have been rewritten in independent form as suggested by the Examiner.

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CONCLUSION:

For the reasons set forth above, the Applicants submit that all claims are allowable over the cited art and define an invention suitable for patent protection. Furthermore, the Applicant
5 respectfully requests reconsideration of the restriction requirement in view of the presence of linking claim 34. The Applicants therefore respectfully request that the Examiner enter the amendment, reconsider the application, and issue a Notice of Allowance in the next Office Action.

Respectfully submitted,

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Joshua D. Isenberg
Reg. No. 41,088
Patent Attorney

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JDI PATENT
204 Castro Lane
Fremont, CA 94539
tel.: (510) 896-8328
20 fax.: (510) 360-9656